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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,495	07/22/2003	Takeo Kawase	116637	6345
25944	7590	06/14/2005	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			DOLAN, JENNIFER M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/623,495	KAWASE, TAKEO	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jennifer M. Dolan	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 14 March 2005.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 37-69 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 37-58,60,61,63,64,66,67 and 69 is/are rejected.
- 7) Claim(s) 59,62,65 and 68 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)          |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | Paper No(s)/Mail Date. <u>05312005</u> .                                    |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/3/05</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____.                                   |

## **DETAILED ACTION**

### ***Specification***

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

In claim 37, the specification does not use the following terminology: “first part”, “first indent”, “second indent”, “second part”, “third indent”, “fourth indent”, and “third part.” Thus, it is unclear exactly which disclosed embodiment is being claimed in claims 37-42.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
3. Claims 37-42 and 48-50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is not clear from the specification exactly what constitutes each indent region, how the indents are arranged, or any functional purpose to the arrangement.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 51 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 51 recites the limitation "the elongate indent regions" in line 8 and "the further elongate indent regions" in line 10. There is insufficient antecedent basis for these limitations in the claim.

#### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 37, 38, 48, 52, 58, 60, 61, 63, 64, 66, 67, and 69 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,696,225 to Kanbe et al.

Regarding claims 37, 38, and 48, Kanbe discloses forming an electronic device (see column 1, lines 5-25) by depositing a first liquid (12) to a first part ('L3', first column; figure 4) between a first indent ('L2', first column) and a second indent ('L4', first column); depositing a

second liquid material that is the same as the first liquid to a second part ('L2', second column) between the first indent and a third indent ('L2', third column); and no material being deposited to a third part (entire row 'L5') between the second indent and a fourth indent (indents below L5 or alternately, L5, second column).

Regarding claim 52, 58, 60, 61, 63, 64, 66, 67, and 69, Kanbe discloses forming an indent region in the surface of a substrate (figure 3, formed from 11); depositing a liquid material (12) onto the surface at selected locations such that the spread of the material over the surface is controlled by the indent region (figures 3, and 4; columns 1-4); and adjusting the wetting characteristic of the surface of the substrate relative to the material to be deposited (column 2, lines 25-55; column 4, lines 1-55). Regarding claims 58, 60, 61, 63, 67, and 69, it is inherently the case that for droplets retained on a raised surface by surface tension, the volume of liquid retained, the contact angle between the liquid and the surface, and the thickness of the liquid retained is greater than in the absence of at least one of the indents, since by removal of one of the indents, the droplet would spread over a larger region than the width of the raised portion, and thus flatten (also see column 1, lines 52-65; column 4, lines 15-45). Regarding claims 64 and 66, Kanbe discloses that the distance between indents is selected such that the diameter of the deposited liquid is greater than the distance (figure 4; column 4, lines 15-45).

8. Claims 52, 58, 60, 61, 63, 67, and 69 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2003/0080143 to Kale et al.

Regarding the claims, Kanbe discloses forming an indent region in the surface of a substrate (12, figure 9); depositing a liquid material (10) onto the surface at selected locations

such that the spread of the material over the surface is controlled by the indent region (figures 9-10; paragraphs 0023, 0142-0143); and adjusting the wetting characteristic of the surface of the substrate relative to the material to be deposited (paragraphs 0024, 0141). Regarding claims 58, 60, 61, 63, 67, and 69, it is inherently the case that for droplets retained on a raised surface by surface tension, the volume of liquid retained, the contact angle between the liquid and the surface, and the thickness of the liquid retained is greater than in the absence of at least one of the indents, since by removal of one of the indents, the droplet would spread over a larger region than the width of the raised portion, and thus flatten (also see paragraphs 0142-0143).

9. Claims 52-55 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2003/0235678 to Graham et al.

Regarding claims 52-55 and 57, Graham discloses a patterning method comprising: forming indent regions (depressions in figures 1, 2, and 5) in the surface of a substrate, and depositing a liquid material onto the surface at selected locations such that the spread of material is controlled by the indent region (see paragraphs 0012, 0015, 0036-0039).

Regarding claim 52, Graham further discloses adjusting a wetting characteristic of the substrate (paragraphs 0055-0058).

Regarding claim 53, Graham further discloses that the indent regions can be elongate (paragraphs 0039-0041) having a substantially planar bottom surface (figure 1; secondary microstructure is very small, making it “substantially planar” with respect to the indent walls) and have a cross-sectional profile (figures 5 and 6; item 540) providing a secondary barrier (paragraphs 0048-0051).

Regarding claims 54, 55, and 57, Graham discloses that the indents are formed using stamping or molding techniques (see paragraphs 0071-0072).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graham et al.

Regarding claim 43, Graham discloses depositing a liquid material onto an indent region ('depressed regions' in figures 3-6; also see paragraphs 0012, 0015, 0036-0039) having wall portions (521) that have slopes relative to a surface of a substrate (paragraph 0039). Graham further suggests that any geometric or random configuration may be used, and parameters such as the wall angle may be optimized when shaping the walls of the indents (see paragraphs 0039-0041).

Graham does not specifically teach the use of an indent region widening toward the bottom.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify that the indent region microstructure of Graham may have wall angles such that the indent region widens near the bottom. The rationale is as follows: A person having ordinary skill in the art would have been motivated to provide indent regions widening toward

the bottom, because Graham suggests that any geometric shape may be used and that the wall angle can be altered and optimized for any specific application (see paragraphs 0039-0041). Since Graham further teaches that the indent region is used to prevent wicking/capillary action between the liquid in the indent region and the substrate (see paragraph 0015) and that the microstructure must have sufficient capacity to control the placement of a single drop of ink with no overflow of the ink (paragraphs 0038-0042), it would be reasonable for a person skilled in the art to optimize the wall angle and thus select an indent region widening at the bottom in order to decrease the degree of wicking between the fluid and the surface as well as increase the volume capacity of the indent.

Regarding claims 44 and 45, Graham discloses that the indent region is formed with a cross sectional profile (figures 3, 5, 6) formed as a castellated or saw-tooth profile (paragraphs 0039, 0046-0049) that forms a secondary barrier to further control the spread of the material over the surface (paragraphs 0048-0051).

Regarding claim 46, Graham teaches that saw-tooth shapes are appropriate for the microstructures fluid barrier (paragraph 0039), and that a secondary barrier in the indent can be provided for enhanced control (paragraphs 0047-0049).

Graham fails to specifically state that the secondary barrier may have a saw-tooth shape.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the indent region of Graham, such that the secondary barrier has a saw-toothed profile. The rationale is as follows: A person having ordinary skill in the art would have been motivated to provide a saw-toothed profile, because Graham teaches that any geometric shape including vertical or angled walls can be advantageously used as an element to control

microfluid placement (paragraphs 0038-0039). Since the secondary barrier structure serves a similar function as the primary structure, and since Graham only specifically teaches the shapes appropriate for the primary structure, it is well within the purview of a person having ordinary skill in the art to deduce that the cited microstructure elements for controlling the placement of individual fluid drops are appropriately used for both the primary and secondary microstructures (see Graham, paragraphs 0038-0039).

Regarding claim 47, Graham discloses that the indent regions can be elongate (paragraphs 0039-0041) having a substantially planar bottom surface (figure 1; secondary microstructure is very small, making it “substantially planar” with respect to the indent walls).

12. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,723,394 to Sirringhaus et al. in view of Kanbe et al.

Sirringhaus discloses a patterning method comprising: using an ink jet deposition method to deposit a liquid material onto the surface of a substrate at selected locations, wherein the ink-jet material is a conductive polymer used to provide electrically conductive electrodes (see column 6, lines 18-24).

Sirringhaus fails to specify exactly how the location of the ink-jet deposited fluid is controlled.

Kanbe teaches that ink-jet deposited fluids may be precisely controlled by disposing such fluids on the surface between indents, and that the indents may further be shaped in elongate lines (figures 3, and 4; columns 1-4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the ink-jet conductive polymer deposition of Sirringhaus with the indent-method for controlling ink-jet fluid disposition taught by Kanbe. The rationale is as follows: A person having ordinary skill in the art would have been motivated to use indents to control the placement of the conductive polymer of Sirringhaus, because Kanbe shows that by depositing the on the surface of a substrate between indents, minute patterns can be formed with very high accuracy in the placement and extent of the patterned features (see Kanbe, columns 1-4).

***Allowable Subject Matter***

13. Claims 59, 62, 65, and 68 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for allowability is that the claims specifically require that in a patterning method where the liquid is disposed on a raised surface between two indents, the indent wall portions are sloped. The only prior art references of record using a similar ‘surface tension’ type retention of droplets (Kanbe et al., Kale et al, or US 2004/0009608 to Caren et al.), where the droplets are disposed on a raised portion between indents, only teach the usage of vertical sidewalls for the indents, rather than sloping sidewalls. Since the slope of the sidewall greatly affects the contact angle and surface tension of the deposited droplet, which in turn affects the capacity of the raised portion and the ability of the raised portion to retain droplets, it

is the Examiner's opinion that sloped indent sidewalls are a critical and unobvious modification to the teachings of the prior art.

***Response to Arguments***

15. Applicant's arguments with respect to claims 37-69 have been considered but are largely moot in view of the new grounds of rejection. Insofar as some of the arguments are relevant to the rejections of the newly added claims, the arguments are not persuasive for the following reasons:

Regarding the Graham et al. reference, the Applicant argues that the ink is printed into the voids between the microstructures and not on top of a raised region to control the spread of the droplet.

The Examiner agrees with this characterization of Graham. As the claims are presently phrased, however, only claims 37-42 and 58-69 specify that the liquid is retained on the raised portion between indents. Claims 43-57 only require the deposition of a liquid into an "indent region" where the indent region controls the spread of the material over the surface. It is noted by the Examiner that the surface of the substrate would include the surface of the indents as well as the raised surface between them, and that an "indent region" in the plainest English is simply a region having an indent. Clearly, the microstructures of the Graham reference, by retaining the liquid inside of the indent, meet the limitations of depositing the liquid into the indent region or on the surface, where the indent region controls the spread of the material.

Regarding Kale reference, the Applicant argues that in Kale, "the distance between the substrate and the capillary is by far the most important factor among those parameters deciding

the volume of the dispensed droplet,” and that the diameter of the droplets in Kale is the same as that of the column.

The Examiner agrees that the teachings of Kale would not anticipate claims 64-66, which specifically require the retention of a droplet having a larger diameter than the post, the remainder of the claims do not provide any limitations on the resultant diameter of the droplet. Since Kale does teach that the raised portions retain the droplets through surface tension, and thus ‘control the spread of deposited material,’ Kale is considered to meet the limitations of the claims rejected supra.

### ***Conclusion***

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan  
Examiner  
Art Unit 2813

jmd



CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800